South Carolina College- and Career-Ready Standards for Mathematics

Support Document

2nd Grade

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As support for implementing the *South Carolina College- and Career-Ready Standards for Mathematics*, the standards for each grade K-5 have been grouped into possible units. In the *Table of Contents* below, the titles for those possible units are listed in a column under each grade. To see which standards are addressed in each unit for this grade and to read a brief description of the focus for each unit in this grade, click on the *Overview of Units* in the [Table of Contents](). The completed units for this grade are hyperlinked from/to the *Table of Contents* and the *Overview of Units*. The purpose of this document is to provide guidance as to how all the standards at this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students.

Acknowledgments

"Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. *Gratitude is the memory of the heart.* Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness." It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by the following individuals who are making the K-5 Mathematics Support Document possible. (http://quotations.about.com/od/ThankYou/a/Gratitude-Quotes.htm)

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	Table of Contents for Grades K-5					
	K	**1st**	**2nd**	**3rd**	**4th**	**5th**
	Overview of Units	**Overview of Units**	**Overview of Units**	**Overview of Units**	**Overview of Units**	**Overview of Units**
Unit 1	Counting and Cardinality	Composing and Decomposing Numbers Through 10	Place Value Concepts	Conceptual Understanding of Multiplication & Division	Place Value, Addition, & Subtraction with Whole Numbers	Expressions, Equations, & the Coordinate Plane
Unit 2	Understanding Relationship of Counting and Quantity	Addition and Subtraction Strategies	Developing Concepts of Addition and Subtraction	Place Value	Algebraic Thinking	Place Value
Unit 3	Count and Compare	Understanding Place Value	Application of Addition and Subtraction	Addition & Subtraction	Multiplication & Division of Whole Numbers	Operations with Whole and Decimal Numbers
Unit 4	Composing and Decomposing Numbers	Applying Place Value Concepts	Attributes of Polygons and Fractional Parts	Application of Multiplication & Division	Fraction Equivalence	Adding and Subtracting Fractions
Unit 5	Addition and Subtraction	Comparisons and Data	Measurement: Length	Conceptual Understanding of Fractions	Adding, Subtracting, & Multiplying with Fractions	Multiplying with Fractions
Unit 6	Patterns and Positions	Geometry and Equal Shares	Measurement: Time and Money	Data Analysis	Decimal Concepts	Dividing with Fractions
Unit 7	Two Dimensional and Three Dimensional Geometry	Measurement, Time, and Money	Creating and Understanding Data	Identification and Classification of Geometric Shapes	Conversions & Problem Solving with Measurement	Classifying 2D Shapes
Unit 8	Foundations of Measurement			Problem Solving with Measurement	Geometric Classifications & Line Symmetry	Perimeter, Area, and Volume
Unit 9	Understanding Graphs and Data			Fluency with Multiplication & Division	Angle Measurement	Converting Measurements within a Single System

Grade Two Overview of Units

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Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Place Value Concepts	**Developing Concepts of Addition and Subtraction**	**Application of Addition and Subtraction**	**Attributes of Polygons and Fractional Parts**	**Measurement: *Length***	**Measurement: *Time and Money***	**Creating and Understanding Data**
Standards	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**	**Standards**
2.NSBT.1 2.NSBT.2 2.NSBT.3 2.NSBT.4 2.ATO.3	2.NSBT.5 2.NSBT.6 2.NSBT.7 2.NSBT.8 2.MDA.5	2.ATO.2 2.ATO.1 2.ATO.4 2.G.2	2.G.1 2.G.3	2.MDA.1 2.MDA.2 2.MDA.3 2.MDA.4	2.MDA.6 2.MDA.7	2.MDA.8 2.MDA.9 2.MDA. 10
Unit Focus	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**	**Unit Focus**
Unit 1 will focus on the development of numeracy and place value concepts for the one's, ten's and hundred's places at a concrete (manipulative) level. Students will then use this conceptual understanding to 1) decompose numbers, 2) expand numbers, and 3) compare numbers.	After students have fully developed place value concepts, students will use those concepts in **Unit 2** to add and subtract four 2-digit numbers, and two 3 digit numbers (through 999). Students are expected to use place value strategies, concrete models, and properties of operations to develop their own strategies. Standard algorithms are not to be introduced at this early level of development.	In Unit 2, students developed models for addition and subtraction. **Unit 3** requires students to apply those strategies to solve one- and two-step word problems, to demonstrate fluency with addition and subtraction through 20 and to use repeated addition to compose and subtraction to decompose arrays with up to five rows and five columns.	Students must be able to identify shapes based upon specified attributes (number of angles, number of equal faces) in **Unit 4.** They will also use the terms "halves", "fourths", "half of" and "fourth of" to describe geometric shapes that have been equally divided. *Students are **not** expected to use the fractional symbols with numerators and denominators.*	In **Unit 5,** students will use rulers, yardsticks, meter sticks, and measuring tapes to: 1) measure the length of an object in customary and metric units, 2) compare the lengths of two measured objects, and 3) measure the same object using different units of measurements (feet vs. inches) and explain why the measurements differ.	**Unit 6** requires students to solve money story word problems in dollars, quarters, dimes, nickels, and pennies. Students must also be able to tell time to the nearest 5-minute interval on analog clocks.	In previous Unit 5 students learned to measure length using measuring tools; in **Unit 7**, students will organize measurement data into line plots marked into whole number units. Students will also collect data to create, represent, and draw conclusions from picture graphs and bar graphs with a single unit scale.

Place Value Concepts

Content Standards with Clarifying Notes

Open Bullets Indicate Clarifying Notes

- **2.NSBT.1** Understand place value through 999 by demonstrating that:
  a. 100 can be thought of as a bundle (group) of 10 tens called a "hundred"; b. the hundreds digit in a three-digit number represents the number of hundreds, the tens digit represents the number of tens, and the ones digit represents the number of ones; c. three-digit numbers can be   decomposed in multiple ways (e.g., 524 can be decomposed as 5 hundreds, 2 tens and 4 ones or 4 hundreds, 12 tens, and 4 ones, etc.)

  - *Second graders should come to see a set/group of 10 tens as a new unit called 100 (hundred).*
  - *It is important to note that 3 digit numbers can be decomposed in multiple ways (as a basis for later concepts of addition/subtraction regrouping).*
- **2.NSBT.2** Count by tens and hundreds to 1,000 starting with any number
  - *example: "Count by 10's starting at 350" (350, 360, 370, 380, etc)*
  - *example: "Count by 100's starting at 350" (350, 450, 550, 650, etc)*
- **2.NSBT.3** Read, write and represent numbers through 999 using concrete models, standard form, and equations in expanded form
  - *concrete models could be diagrams/pictures or actual manipulatives*
  - *standard form is numerical form (e.g. 387)*
  - *equations in expanded form (e.g. 300 + 80 + 7= 387) [note: expanded form does NOT have to occur in any sequential order (e.g. 80 + 7 + 300= 387)*
- **2.NSBT.4** Compare two numbers with up to three digits using words and symbols (i.e., >, =, or <)
  - *Students should be required to compare numbers with words (greater than, less than, equal to) as well as symbols.*
- **2.ATO.3** Determine whether a number through 20 is odd or even using pairings of objects, counting by twos, or finding two equal addends to represent the number (e.g., 3 + 3 = 6).
  - T*he focus of this standard is based on the conceptual understanding of even and odd numbers. An even number is an amount that can be made of two equal parts with no leftovers. An odd number is one that is not even or cannot be made of two equal parts.* ***The number endings of 0, 2, 4, 6, and 8 are only an interesting and useful pattern or observation and should not be used as the definition of an even number***. *(Van de Walle & Lovin, 2006, p. 292)*

New Academic Vocabulary for This Unit			
● number value	● = (equal to)	● < (less than)	● > (greater than)
● even number	● number place	● expanded form	

Prior Knowledge Required for This Unit

In first grade, students used concrete models to represent numbers up to 100 in expanded form.   First graders also demonstrated that ten ones are thought of as a bundle. In second grade, students should use the correct terminology that 100 ones or 10 tens = one hundred (100).

First graders also learned to count forward by ones to 120; starting at any number as well as by 5's and 10's to 100, starting at any number. In this unit, students are required to count by 10's or 100's starting at any number to 1,000.

Subsequent Knowledge Related to This Unit

In this Unit, students will develop conceptual understandings of place value through 999; this understanding will lead to students developing strategies for addition and subtraction based on place value in the next unit-- Unit 2. In 3rd grade, students will then use knowledge of place value to round numbers to nearest 10's and 100's. They will also learn to multiply one-digit numbers by multiples of 10 using knowledge of place value.

It is important that students develop place value concepts to use in rounding as well as for addition/subtraction.

Relationship Among Standards in This Unit

The various standards in the unit were combined to develop an in-depth understanding of place value concepts especially when decomposing numbers. Expanded form is one way to think about decomposing numbers (e.g., 125 can be written as $100 + 20 + 5$) and is a valuable skill when students use place value strategies. Those conceptual understandings will help students develop addition and subtraction strategies especially when regrouping is needed to add and subtract large numbers in **2.NSBT.7.**

Students will also use place value knowledge to develop definitions for odd and even numbers in standard **2.ATO.3**. When students decompose (pull apart) numbers based on place value, separating the 10's and 1's place, they will see that the "tens" is always divisible by two (can be halved), therefore the digit in the one's place must determine if the overall number is even or odd. Using place value to write numbers in expanded form (**2.NSBT.3**) will support skip counting by 100's and by 10's (2.NSBT 2) since students should be able to see which place is increasing (ex: count by

100's starting at 482; (400 + 80 + 2).   (500 + 80 + 2), (600 + 80 + 2).

Potential Instructional Strategies/ Lessons

2. ATO. 3   Odd and Even Numbers
(Adapted from https://www.teachervision.com/math/lesson-plan/48936.html)

Objective

In this lesson, the concept of odd and even numbers is explored using manipulatives. A hundreds chart is used to show the alternating pattern of odd and even numbers, and students are asked to extend the pattern to identify additional odd and even numbers. Students will identify odd and even numbers and patterns in number sequences.

Materials

Provide each student with:
- 2 copies of a hundreds chart
  - (link to printable hundred's chart)   http://www.mcps.org/FBE_Files/100.pdf
- 50 counters
- 2 green crayons

Procedure

Give students an odd and an even number of counters and request that they arrange each set in groups of two. Allow time for student work, then ask them to turn to a partner and share what they notice. (The odd number has one "left over"). Repeat this several times using a different odd and even number of counters and make a chart to show results. (Using numbers in sequence will help with the later discussion, i.e. 4 counters in one group and 5 counters in the other; 6 counters in the next group and 7 in the other, etc.) Discuss the results on the chart. After making observations about the chart findings, some directed teaching is needed in order to identify and use the terms *odd* and *even*. Based on observations, make predictions about other numbers.

Have students use the green crayon to color the squares with the numbers they identified as even on their hundreds charts. Ask students to continue using this method to find all the even numbers up to 20. Ask students to describe patterns they see on the shaded hundreds chart, and elicit that every other number is green, or even. Have students use their green crayons to continue the pattern on the charts up to the number 50. Ask students to circle one even number and one odd number between 20 and 50 on the chart. Then ask students to have their partner use counters to verify their choices. Discuss their findings.

Repeat the above process using multiples of ten. This supports counting by 10s to 100 and links the concept of even.

Extension: Discuss how the chart has alternating stripes, or columns, and ask students what is the same in each green-colored column (the digit in the ones place in each number) and what is different (the digit in the tens place). Elicit that the digit in the ones place in each even number is 0, 2, 4, 6, or 8. Write several numbers between 50 and 100 on the chalkboard, and ask students to identify whether each is odd or even.

2.NSBT.3 Introduction to Writing Expanded Form (adapted from http://illuminations.nctm.org/Lesson.aspx?id=3691)
- Printable Expanded Place Value Form Cards
  - http://illuminations.nctm.org/uploadedFiles/Content/Lessons/Resources/3-5/PlaceValueCards%20AS.pdf
- Printable Spinner
  - http://illuminations.nctm.org/uploadedFiles/Content/Lessons/Resources/3-5/Spinner.pdf

Objectives:
Determine the value of each digit in a three-digit number.
Compose and decompose numbers using standard and expanded form.
Use place value to compare the values of numbers

Materials:
Base ten blocks
Cardstock
Place Value Playing Cards Activity Sheet
Spinners
Paper clip and pencil for spinner

Before class, copy the Place Value Playing Cards Activity Sheet and Spinner Activity Sheet on cardstock. Students will work in pairs, so make a copy for each pair of students.

Procedure:
To introduce standard form, write the number 345 on the board and below it write the words "three hundred   forty   five" (leave space between the words). (Since first grade students read, wrote and represented to 100, students should be familiar with the words.) As you point, ask one student to read *three hundred* and another to read *forty* and another to read *five*. Continue and pick up the pace until students are hearing 345 almost all at one time. Then rewrite the words close together and ask several students to read the number. Ask students to turn to a partner and each share how many hundreds do they hear when they read the number 345. Share out. Write 300 + on the board. Ask students to turn to a partner and each share after 300 what do they hear in the number 345? Share out. Write 300 + 40 on the board. Ask students to turn to a partner and each share after 40 what do they

hear in the number 345. Share out. Write $300 + 40 + 5$ on the board. Have students record the number, words and expanded form in their journal. Organize students into pairs. Hand out the base ten blocks. (Review the value of each base ten block.) Ask student pairs to use what they wrote in their journal to model the number 345 using the fewest base ten blocks possible.

With the entire class, count the value of the blocks. Ask students to turn to a partner and share, "How does what you wrote in your journal compare with the model you made?" Share out and compare to the expanded form written on the board. Explain that this is "expanded form". Talk about the word "expand" and how that relates to "expanded form".

Repeat with other 3-digit numbers.

Group students into pairs and pass out the sets of place value cards, one set to each pair. Explain that pairs will play a game. The first student uses the place value cards to compose a number in expanded form, and shows it to the second student. The second student writes the standard form of the number on a slip of paper and shows it to the first student so he or she can confirm or reject. Have students reverse roles.

In the following period, collect the place value cards and redistribute the number cards (excluding the "+" symbols), passing out the cards as evenly as possible so that each student has only 1 or 2 cards in his or her hands. For example, if you have 28 students, each student would get 1 card. If you have fewer students, some students may get 2 cards. If you have more than 28 students, pair students so that all may participate. Have a volunteer use their paper clip, pencil, and spinner to generate a 3-digit number—for example, 6, 3, and 5. Ask students to use each of the numbers exactly once to write in their notebooks the greatest number possible.

Ask, "If we put each number in the hundreds place, what would be the value of each number?" For the example roll, students would hold up the 600, 300, and 500 cards, and walk to the front of the room. Discuss which of the numbers is the greatest. [600] Students with the 300 and 500 cards may then sit down. Do the same with the 30 and 50 cards to pick the tens. [50] That will leave 3 in the ones place.

Take the three cards (600, 50, 3) and stack them together (so the 5 overlaps the 0 in the tens place of 600, and the 3 overlaps the 0 in the ones place of 50) to show that standard form is 653. Ask, "How do we know this is the largest number?" Try to elicit that the digit with the greatest value, 6, is in the hundreds place.

As time allows, continue this activity with other numbers. Have students overlap the cards to solidify the composition of numbers. Because math is not a spectator sport, it would be good if each student's numbers are used at least once during this activity. To keep kids interested, you can

alternatively ask for the least number that could be formed, or the largest odd number, or the least even number, or other types of numbers.

Assessment Options

1. As students work with the base ten blocks, observe if they are correctly identifying the value of the blocks. For example, if they have 3 tens, are they counting by tens to identify the value as 30?

2. Give each student an index card and a spinner. Have each student spin a number 3 times and write all 3 digits on the top of his or her card. Have students write the greatest number they can make with those 3 digits in both standard and expanded form. Ask them to write an explanation on the index card of how they know this is the biggest number they can make with those digits.

2.NSBT.4 Comparing 3 digit numbers.

This lesson builds on **2.NSBT.3** *Introduction to Writing Expanded Form* presented above and uses a similar strategy. Write 345 and 445 on the board. Ask students to listen carefully as the numbers are read. Call on two students to each read a number. Ask students to turn to a partner and tell which number is <u>larger/greater</u> than and how they know. Share out. (Students can build the number using base ten blocks and compare – this is a professional decision based on student needs.) Ask students to turn to a partner and tell which number is <u>smaller/less than</u> and how they know. Share out. Repeat process with different 3-digit numbers using only a different hundreds place. Then keep the hundreds place the same and use a different digit in the tens place. Again asking students to read and discuss. (Again use professional judgment as to whether or not base ten blocks are needed.) Repeat process changing the ones place. After students are comfortable comparing show two numbers that are equal. Ask students to turn to a partner and tell what ways did you ask them to compare the numbers (*larger/greater than, smaller/less than, equal*). Write those words on the board. Show additional numbers and ask students to use words *larger/greater than, smaller/less than, equal* to describe the relationship between the two numbers. Ask students to record the numbers and the comparison words in their journal. Tell students that one of the wonderful things about math is that we can use symbols instead of words to make the communication quicker. Introduce the symbols >, =, or <. Have students re-write the numbers using the new comparison symbols. AVOID the use of the "alligator eats. . ." Such strategy can actually be confusing to students. Focus on student understanding of how the symbols appear – the *less than* part of the symbol points to the smaller/less than number; the wider/*greater than* part of the symbol is next to the larger number. The equal symbol shows that what appears on both sides of the symbol represent the same amount. (The latter note is extremely important because it will help when students are computing missing addends. Typically, students think the equal sign means "perform an operation" and thus the reason missing addend problems are approached incorrectly.)

Practice comparing numbers
(Adapted from https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_2_Unit1Framework.pdf)

Your task is to build numbers and identify them. Use dice and base ten blocks or models to complete this exercise.
1. Roll all 3 dice at once.

2. Create the smallest number possible, using all three dice.

3. Create the largest number possible, using all three dice.

4. Using the smallest number of base ten pieces possible, draw (or build) a model of each number you recorded. Use words to write how each of the two numbers is spoken. Write the numbers in expanded notation.

5. Repeat the same exercise two more times and record.

6. When you have completed all your rolls, put a star beside the greatest number you rolled. Then put a check beside the smallest number you rolled. Explain how you know what the largest and smallest numbers are possible when using three dice.

Roll #1

Smallest Number	Model with Drawings	Expanded Notation (ex. 200 + 30 + 6)
Largest Number	Model with Drawings	Expanded Notation

2.NSBT.4 Comparing 3 digit numbers.   (Downloadable PDf file (save to your desktop) https://www.engageny.org/file/92856/download/math-g2-m3-topic-f-lesson-16.pdf?token=4V10IbATvJHPuoDgsDpR17T5VIcw8ql_OTWFyrHcDKs
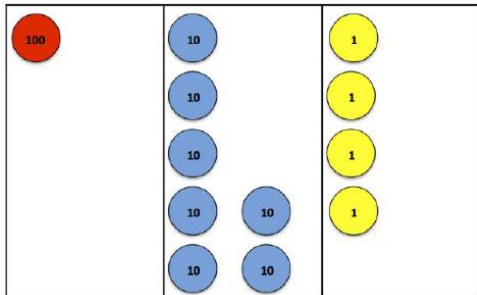
In this 60 minute lesson, students use Place Value Disks (created from colored construction paper) to represent 3 digit numbers.
   ○   printable place value chart: http://lrt.ednet.ns.ca/PD/BLM/pdf_files/place_value_charts/02_to_hundreds.pdf

Resources

Videos:
   ● **2.NSBT.1** Place Value Video

- ○ https://youtu.be/omkDLmfvetk
- **2.NSBT.1** How to decompose numbers video
  - ○ https://learnzillion.com/lessons/2465-add-by-decomposing-numbers
- **2.NSBT.3** How to write expanded form video
  - ○ https://learnzillion.com/lessons/3685-read-and-write-numbers-in-expanded-form-using-arrow-cards

Websites:
- **2.NSBT.1** interactive game (place value)
  - ○ http://www.bbc.co.uk/schools/starship/maths/games/place_the_penguin/big_sound/full.shtml
- **2.ATO.3** printable 100's chart
  - ○ http://www.mcps.org/FBE_Files/100.pdf
- **2.NSBT.3** printable Flat/Rod/Unit sheet
  - ○ http://www.mathatube.com/files/base_ten_blocks-flats-rods-units-2.pdf
- **2.NSBT.3** interactive game where students find numbers in expanded form
  - ○ http://www.topmarks.co.uk/place-value/place-value-charts

Images:

Groupable Base Ten Models

Bean Counters and Cups:
Ten single cups are placed in a portion cup. To make a hundreds put ten cups in a larger tub.

Bundles of Sticks:
Use craft sticks or coffee stirers. To make a hundred, put ten bundles into a larger bunch held together with a rubber band.

Cubes:
Ten single cubes form a bar of ten.
To make a hundred put ten bars on cardboard backing

- image from https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_2_Unit1Framework.pdf

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Sample Formative Assessment Tasks/Questions

Possible ways to formatively assess:
2.ATO.3: (Adapted **https://www.georgiastandards.org/Common-Core/Common**)

Even or Odd: (adapted from https://www.engageny.org/file/118071/download/math-g2-m6-end-of-module-assessment.pdf?token=TFaZc-yoTKtp6HQiQods-R1lxg7xcLcIcFdgGP8yOMM

Does the picture below show an even or an odd number of teddy bears? Explain your thinking using pictures, numbers, or words in the box on the right.
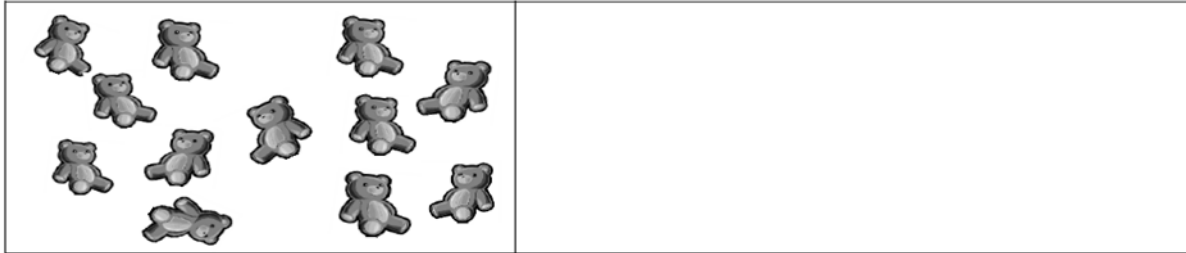
Problem:
    Mr. Robert asked Anna to help another second grader learn about even and odd numbers. He handed Anna 16 red counters and 19 blue counters to help her show and explain ways to identify even and odd numbers to her classmate. What could Anna show and say to her classmate?

Is 16 an even or odd number?	Is 19 an even or odd number?
Draw and explain.	Draw and explain.
16 is an _____ number because _____ (even or odd)	13 is an _____ number because _____ (even or odd)

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Developing Concepts of Addition and Subtraction

Content Standards with Clarifying Notes
Open Bullets Indicate Clarifying Notes

- **2.NSBT.5** Add and subtract **fluently** through 99 using knowledge of place value and properties of operations
  - *Fluently* and *fluency* describe a student's ability to compute with accuracy, flexibility, and efficiency (Kilpatrick, Swafford, & Findell, 2001).
  - The standard algorithm for carrying and borrowing is not a focus or expectation for second grade; students should be encouraged first to develop strategies based on place value and properties of operations.
- **2.NSBT.6** Add up to four two-digit numbers using strategies based on knowledge of place value and properties of operations

  Example: $67 + 25 = \underline{\quad}$

Place Value Strategy:	*Decomposing into Tens:*	*Commutative Property:*
I broke both 67 and 25 into tens and ones. 6 tens plus 2 tens equals 8 tens. Then I added the ones. 7 ones plus 5 ones equals 12 ones. I then combined my tens and ones. 8 tens plus 12 ones equals 92.	I decided to start with 67 and break 25 apart. I knew I needed 3 more to get to 70, so I broke off a 3 from the 25. I then added my 20 from the 22 left and got to 90. I had 2 left. 90 plus 2 is 92. So, 67 + 25 = 92	I broke 67 and 25 into tens and ones so I had to add 60+7+20+5. I added 60 and 20 first to get 80. Then I added 7 to get 87. Then I added 5 more. My answer is 92.

- **2.NSBT.7** Add and subtract through 999 using concrete models, drawings, and symbols which convey strategies connected to place value understanding.
- **2.NSBT.8** Determine the number that is 10 or 100 more or less than a given number through 1,000 and explain the reasoning verbally and in writing
  - "A given number" refers to any number through 1,000, including those that are multiples of 10 (i.e., 400, 620).
- **2.MDA.5** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences through 99 on a number line diagram.
  - Students will use number lines with whole numbers as both a means of solving addition and subtraction, but also as an introduction to using rulers

New Academic Vocabulary for This Unit

- number line

Prior Knowledge Required for This Unit

In Unit 1 (Place Value) students decomposed numbers with an emphasis on expanded form; they will use this knowledge to construct their own addition and subtraction strategies. *It is important that students are given the opportunity to construct their own addition and subtraction strategies.* In 1st grade, students applied the commutative and associative properties of addition to find sums of two or three addends (through 20). In this unit, 2nd graders will use these same properties of addition (as well as properties related to subtraction) to construct methods for adding multi-digit numbers and up to four 2-digit numbers. (ex. 35 + 26 + 18 + 89).

Subsequent Knowledge Related to This Unit

In the next unit, Unit 3—Application of Addition and Subtraction, students will use the conceptual strategies they develop in this Unit 2 in order to build fluency (computations performed flexibly and efficiently) and skill application (using addition and subtraction within real world problems and scenarios).

In third grade, students are expected to add and subtract whole numbers fluently to 1,000 using knowledge of place value and properties of operations. will apply properties of operations (commutative, associative, and distributive) to multiply and divide.

Relationship Among Standards in This Unit

2.NBTS.6 and 2.NBTS.7 both require students to build conceptual number sense with addition and subtraction using strategies that are meaningful to each individual student. As students share their individual solution strategies, it is important that the teacher maintain, through questioning, student focus on the place value and properties of operations that enable each strategy. Teachers are not expected to give students algorithms to use which may by-pass a student's ability to construct number sense based on place value and properties of operations.

2.MDA.5 introduces a number line as an operational tool (for addition and subtraction) for whole numbers 0 - 99. Students also use a hundred's chart in this unit to grasp adding or subtracting 10 from a number and to find patterns in the resulting answer (2.NSTB.8).

Potential Instructional Strategies

Students should be given ample opportunities to use manipulatives (either concrete or virtual) to generate strategies for addition and subtraction. Virtual manipulatives can be used for whole group lessons, or for independent work if students have access to technology.
- virtual manipulatives website:
  - http://nlvm.usu.edu/en/nav/frames_asid_154_g_1_t_1.html?from=category_g_1_t_1.html

After allowing students to manipulate models, move students to pictorial stage. Initially, provide students with copies of pictures of base ten blocks (ones, tens, hundreds) they can use to add or subtract (see *Hundreds/Tens/Ones* under Resources)
(adapted from N.C. Instructional Support Tools)
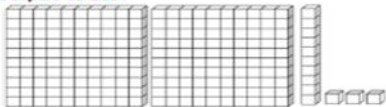
2.NSBT.7   Allow students to solve equations with manipulatives (base ten blocks) (adapted from N.C. Instructional Support Tools)

Example: 213 - 124 = __
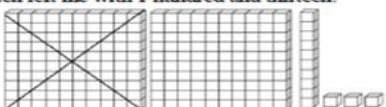
Student A

I used place value blocks. I made a pile of 213.

I then started taking away blocks.

First, I took away a hundred which left me with 1 hundred and thirteen.
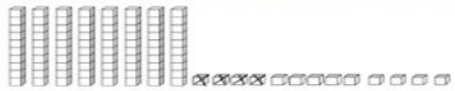
Now, I only need to take away 24.
I need to take away 2 tens but I only had 1 ten so I traded in my last hundred for 10 tens. Then I took two tens away leaving me with no hundreds and 9 tens and 3 ones.

I then had to take 4 ones away but I only have 3 ones. I traded in a ten for 10 ones. I then took away 4 ones.

This left me with no hundreds, 8 tens and 9 ones. My answer is 89. 213 - 124 = 89

2.MDA.5 Have students solve subtraction equations (or word problems) using a number line
- printable number line:
  - http://lrt.ednet.ns.ca/PD/BLM/pdf_files/number_lines/number_lines_number_2.pdf

Example: There were 27 students on the bus. 19 got off the bus. How many students are on the bus?

Student A: I used a number line. I started at 27. I broke up 19 into 10 and 9. That way, I could take a jump of 10. I landed on 17. Then I broke the 9 up into 7 and 2. I took a jump of 7. That got me to 10. Then I took a jump of 2. That's 8. So, there are 8 students now on the bus.

$$27 - 19 = 8$$
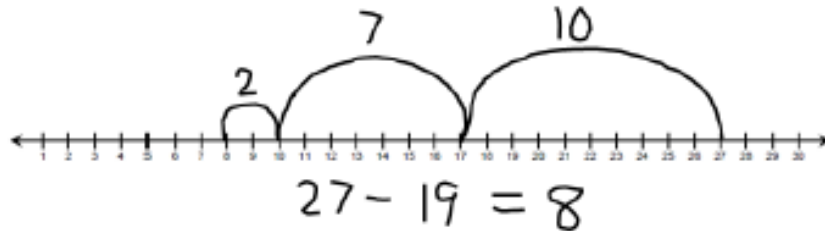
(adapted from N.C. Instructional Support Tools)

2.NSTB.8 Determining 10 more or 10 less than a given number in Number Talk Discussion
(adapted from https://www.georgiastandards.org/Common-Core/Common%20Core%20Frameworks/CCGPS_Math_2_Unit2Framework.pdf)

MATERIALS
• 200 chart per student (*printable 200's chart in Word forma*t: http://lrt.ednet.ns.ca/PD/BLM/word_files/number_charts/1%20-200_chart.doc
• Class 200 Chart
• Transparent counters or highlighters

Procedure:
Gather students in the meeting area. Display for the class the 200 chart. Give each student a 200 chart. Select a starting number. Have students place a transparent counter on it or highlight it. Give students directions one at a time using the terms add 10, subtract 10, add 1, subtract 1, 10 more, 10 less, 1 more, and 1 less. After each clue, give students the opportunity to count up using their chart, if they need to and then have students move their transparent counter to the new number.

Model this with the class, using only 3 or 4 directions. When the last direction has been given, ask students what number their transparent counter is on.

Sample direction set:
• *Place your counter on 16.*

• Add 10. (students should move their counter to 26)

• Subtract 1. (students should move their counter to 25)

• Move ahead 10 more. (students should move their counter to 35)

• What number is the counter covering? (35)

Resources

Videos:
- 2. NSBT.7 video adding numbers using decomposing (place value)
  - https://learnzillion.com/lessons/2465-add-by-decomposing-numbers
- 2.MDA.5: video explaining number lines with addition
  - https://learnzillion.com/lessons/2687-add-by-using-a-number-line
- 2.NSBT.6: video demonstrating adding 4 digit numbers
  - https://learnzillion.com/lessons/2804-add-up-to-four-2-digit-numbers-using-place-value

Worksheets/Printables
- 2.NSBT. 7 printable sheet with Flat/Rod/Units
  - http://www.mathatube.com/files/base_ten_blocks-flats-rods-units-2.pdf

Sample Formative Assessment Tasks/Questions

2.MDA.5 Sample Task Adapted from http://schools.nyc.gov/NR/rdonlyres/CAC1375E-6DF9-475D-97EE-E94BAB0BEFAB/0/NYCDOEG2MathCarolsNumbers_Final.pdf

Carol's teacher drew a number line on the board.
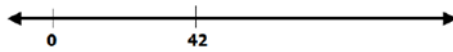
3. About where would 85 be? Place 85 on the number line where it belongs.

4. About where would 21 be? Place 21 on the number line where it belongs.

5. About where would 31 be? Place 31 on the number line where it belongs.

Tell Carol how you knew where to place 31 and why.

_____
_____
_____

Sample Answer:

Carol's teacher drew a number line on the board.
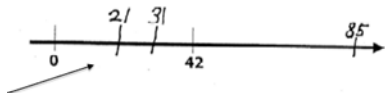
1. About where would 85 be? Place 85 on the number line where it belongs.

2. About where would 21 be? Place 21 on the number line where it belongs.

3. About where would 31 be? Place 31 on the number line where it belongs.

Tell Carol how you knew where to place 31 and why.

You place the 31 in the middle and a little smaller because 31 is ten more than 21 and is 11 less than 42.

2.NSTB.7 and 2.NSTB.8 Addition Strategies / 10 more/less than a number

(adapted from NYS Common Core mathematics curriculum)

Susan and James solved 125 + 32 in different ways. Explain why both ways are correct.

Susan's Way:	James' Way:
125 + 32 125 $\xrightarrow{+10}$ 135 $\xrightarrow{+10}$ 145 $\xrightarrow{+10}$ 155 $\xrightarrow{+2}$ $\boxed{157}$	125 + 32 125 + 30 + 2 = $\boxed{157}$
Explanation:	Explanation:

_____

_____

2.NSTB.7 Comparing different strategies for adding (adapted from NYS Common Core mathematics curriculum)

Linda and Keith added 127 + 59 differently. Explain why Linda's work and Keith's work are both correct.

Linda's work:	Keith's work:
127 + 59 ———— 16 70 +100 ———— 186	127 + 59 ———— 186

Return to

Application of Addition and Subtraction

Content Standards with Clarifying Notes

Open bullets indicate clarifying notes

- **2.ATO.2** Demonstrate **fluency** with addition and related subtraction facts through 20.
  - Fluently and fluency describe a student's ability to compute with accuracy, flexibility, and efficiency (Kilpatrick, Swafford, & Findell, 2001).
  - Fluent Mental Strategies Include:
    Counting on
    Making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$)
    Decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$)
    Using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$)
    Creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12$, $12 + 1 = 13$
    Doubles and Near Doubles (see strategy above)
- **2.ATO.1** Solve one- and two-step real-world/story problems using addition (as a joining action and as a part-part-whole action) and subtraction (as a separation action, finding parts of the whole, and as a comparison) through 99 with unknowns in all positions.
  - For an explanation of the various actions see standard 2.ATO.1 in the Potential Instructional Strategies section of this unit.
- **2. ATO. 4** Use repeated addition to find the total number of objects arranged in a rectangular array with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends
  - Example:
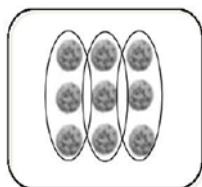
$3 + 3 + 3 = 9$

- **2.G.2** Partition a rectangle into rows and columns of same-size squares to form an array and count to find the total number of parts.
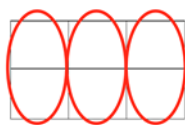 - Example:

  Skip Counting:
     2, 4, 6

  2 rows of 3 columns

  Repeated Addition
     $3 + 3$

- array
- columns (in an array)
- groups (in an array)
- rows (in an array)
- related facts (fact family)
- repeated addition

Prior Knowledge Required for This Unit

In Unit 1 students developed strategies for numeracy and place value concepts for the ones, tens, and hundreds places at a concrete (manipulative) level. Students then used this conceptual understanding to a) decompose numbers, b) expand numbers, and c) compare numbers.

In Unit 2 students developed models for addition and subtraction to add and subtract a) four 2-digit numbers, and b) two 3 digit numbers (through 999). Students were expected to use place value strategies, concrete models, and properties of operations to develop their own strategies. Standard algorithms were not introduced at this early level of development.

Subsequent Knowledge Related to This Unit

The strategies and concepts developed within this second grade Unit 3 will serve as the basis for 3rd grade work where students will solve word problems with larger numbers.

2.ATO.4 is part of the algebraic strand and the focus of this indicator is for students to be able to create a repeated addition equation based upon a

rectangular array. This skill will be needed for 2.G.2, where students will use the repeated addition strategy to find the "total number of parts" in an array – which in turn supports third grade work with area.

Relationship Among Standards in This Unit

This **Unit 3** requires students to use strategies to 1) solve one- and two-step word problems (2.ATO.1) and 2) demonstrate fluency with addition and subtraction through 20 (2.ATO.2). It is important that students develop fluency within 20 using mental strategies.

Potential Instructional Strategies

2.ATO.1:
The emphasis for this standard is application of the students' previously developed addition and subtraction strategies to solve one- and two-step real-world /story problems. The standard refers to part-part-whole, joining, separation, parts of the whole and comparison actions. An explanation of those actions can be found at
http://www.cbv.ns.ca/consultants/uploads/MathConsultant/Part-Part%20Whole.pdf

The following is an additional explanation of the addition and subtraction actions set forth in standard 2.ATO.1:
Addition
    Joining Action
        Part-Part-Whole

JOIN	EXAMPLE PROBLEM
Result Unknown	Laina had four dolls. She bought two more. How many dolls does she have now? $4 + 2 = \square$
Change Unknown	Laina had four dolls. She bought some more dolls. Now she has six dolls. How many dolls did Laina buy? $4 + \square = 6$
Initial Quantity Unknown	Laina had some dolls. She bought two more dolls. Now she has six dolls. How many dolls did Laina have before she bought some more? $\square + 2 = 6$

        Parts of a Whole

PART-PART-WHOLE	EXAMPLE PROBLEM
Whole Unknown	Five boys and three girls are on the basketball team. How many children are on the basketball team? $5 + 3 = \square$
One Part Unknown	Eight children are on the basketball team. Five are boys and the rest are girls. How many girls are on the basketball team? $5 + \square = 8$

Subtraction

       Separation

SEPARATE	EXAMPLE PROBLEM
Result Unknown	Rodney had ten cookies. He ate three cookies. How many cookies does Rodney have left? $10 - 3 = \square$
Change Unknown	Rodney had ten cookies. He ate some of the cookies. Now he has seven cookies left. How many cookies did Rodney eat? $10 - \square = 7$
Initial Quantity Unknown	Rodney had some cookies. He ate three cookies. Now he has seven cookies left. How many cookies did Rodney have to start with? $\square - 3 = 7$

Comparison

COMPARE	EXAMPLE PROBLEM
Difference Unknown	Ahmed has two brothers. Christine has three brothers. Christine has how many more brothers than Ahmed? $3 - 2 = \square$ or $2 + \square = 3$
Larger Quantity Unknown	Ahmed has two brothers. Christine has one more brother than Ahmed. How many brothers does Christine have? $2 + 1 = \square$
Smaller Quantity Unknown	Christine has one more brother than Ahmed. Christine has three brothers. How many brothers does Ahmed have? $\square + 1 = 3$ or $3 - \square = 1$

An interactive website for part-part-whole word problems is   http://thinkingblocks.com/

_____

2.ATO.4

While this standard appears to be almost negligible in content, it is one of the most important standards in 2nd grade. Implied in the standards is the understanding that students will:

    a. Recognize that when building an array, the size of each group must be equal (<u>repeated</u> addition)

    b. Recognize the size of each group in a given array (addends)

c. Recognize the number of equal groups in a given array (the number of addends)
d. Build/construct an array given the size and number of groups.

Students in 3rd grade will then use that knowledge as the basis for understanding multiplication.

Teacher NOTES:
 It is extremely important that students are gradually introduced to the concept of array by first dealing with terms such as *rows* and *columns* and how those terms are related to the size of each group (row) and the number of groups (columns). Building on that understanding, then the term *array* can be introduced. It should not be assumed that all students have a firm understanding of rows and columns as they relate to repeated addition.

Using counting objects to create rows and columns (arrays) (AIMS Math)
- [Blank Array Workmat (one for each student)](#)
- inch square counters (various colors)
  - Have students use different colored counters to build rows. These will represent the "groups".
  - Have students combine rows to create an array.
  - Have student create a repeated addition equation for the array.
  - *2nd grade indicator requires students to create up to 5 by 5 arrays*
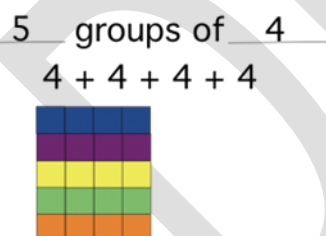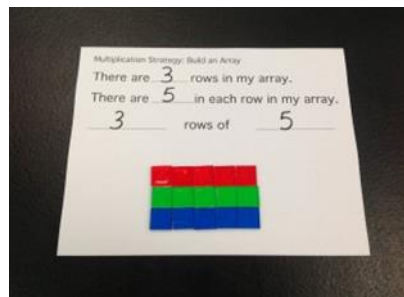
Using Playing Cards as groupings
- 5 Sets of Playing Cards (separated out and sorted by numbers (all 2's, all 3's, etc)
- math journals (or notebook paper); per student
  - Give groups of students a baggy of sorted cards (ex. group may get bag with five 3's)

- Have students place the cards on table
- Have students record a repeated addition sentence for the card grouping
- Let students compare recorded sums.
- Independent Practice sheet (or assessment)

_____

Extension Activity for students: Decomposing Arrays into
- Array Recording Sheet
- Colored pencils/ crayons
  - Have students create two arrays on the same grid (one color for each array)
  - Have students write repeated addition sentences to match each array.
  - Have students add the two sums from the repeated addition sentences
  - Ask students if this number matches the total area (squares) for both arrays.
  - Have students explain and then repeat with other arrays

It is extremely important that emphasis be placed on the fact that with repeated addition the addends are equal. In first grade students were required solve story problems with three whole number addends – not repeated/equal addends. Unless students are given the opportunity to make the distinction that arrays represent repeated addition and thus the addends must be equal versus simply adding different numbers, it could result in confusion.

Four lessons that support gradual understanding of composing/decomposing and using arrays to solve repeated addition can be found at:
link to EngageNY lessons : files come as downloadable ZIP file https://www.engageny.org/file/118086/download/math-g2-m6-topic-b-lessons-5-9.zip?token=w2bySnsWiQViQGAU1p2FrBo2paFgVsjQZNa1kaLDM9k
    The sequence and an overview of the four lessons found at that link are:

A Teaching Sequence Toward Mastery of Arrays and Equal Groups

Objective 1: Compose arrays from rows and columns, and count to find the total using objects.
(Lesson 5)

Objective 2: Decompose arrays into rows and columns, and relate to repeated addition.
(Lesson 6)

Objective 3: Represent arrays and distinguish rows and columns using math drawings.
(Lesson 7)

Objective 4: Create arrays using square tiles with gaps.
(Lesson 8)

Objective 5: Solve word problems involving addition of equal groups in rows and columns.
(Lesson 9)

2.G.2 Partitioning a Rectangle

It is just an important to decompose an array as it to compose an array. Deconstruction can be introduced as either subtracting equal groups from an array or partitioning a rectangle as required by standard 2.G.2. Regardless, emphasis should again be placed on the need for equal groups.

A possible lesson for decomposing and discussing the components of arrays can be found at
click on link to download PDF file **https://www.engageny.org/file/71796/download/math-g2-m6-topic-c-lesson-14.pdf?token=JK4r33qp6PJlovEEFbtGkLZk6vhj5c6h6rQ7ivndD_w**

At that link students use scissors to partition a rectangle into same-size squares, and compose arrays with the squares. The lesson has students cut apart different rectangles (after labeling rows and columns) and then recombine square grids to create a new rectangle.

Rectangle A
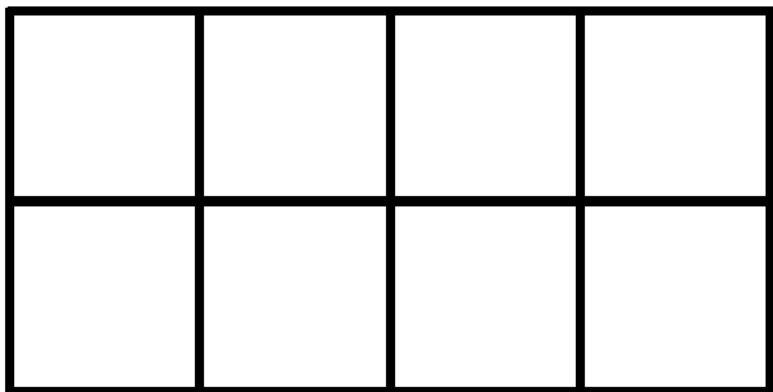
Resources

Addition and Subtraction Worksheets (printable) http://www.math-aids.com/Addition/Addition_Drills.html

Solving Word Problems using Thinking Blocks (interactive site)
http://www.mathplayground.com/tb_addition/thinking_blocks_addition_subtraction.html

Word Problem Generator Site (you provide parameters) http://www.math-aids.com/Word_Problems/Addition_1Digit_2Addends.html

Sample Formative Assessment Tasks/Questions

2.ATO.4 Drawing an Array and then create an addition equation (adapted from Engageny.org)

Using the entire rectangle, draw 3 rows of 5 squares. The first row is done for you. Then, write a repeated addition sentence that describes your array.

Near 20

Materials: Numeral cards (1-9)

9	6	4

1. Shuffle a pack of numeral cards and deal five to each player.

2. Each player chooses three cards that add to 20, or as near to 20 as possible, and records the equation.

3. Find your score by calculating the difference between the sum of your cards and 20.

    Example: Mario picks the cards 9, 6, and 4 and writes 9+6+4=19. He subtracts 19 from 20 for a score of 1 because 20-19 = 1.
    Lisa picks the cards 8,9, and 5 and write 8+9+5=22. She subtracts 20 from 22 for a score of 2 because 22-20=2.

4. Play ten rounds. At the end of the game add the scores for each player. The player with the lowest total is the winner.

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Use the array of squares to answer the questions below.
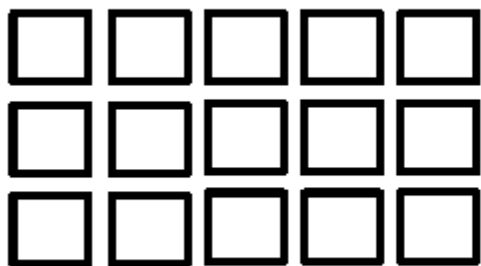
a. There are _____ squares in each row.

b. _____ + _____ + _____ = _____

c. There are _____ squares in each column.

d. _____ + _____ + _____ + _____ + _____ = _____

Return to

Attributes of Polygons and Fractional Parts

Content Standards with Clarifying Notes
*Open bullets indicate clarifying note*s

- 2.G.1 Identify triangles, quadrilaterals, hexagons, and cubes. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.
  - Two-Dimensional Defining Attributes for 2nd grade
    - Closed figure (discussed in 1st grade with other shapes)
    - Straight sides\edges (discussed in 1st grade with other shapes)
    - Number of sides/edges (discussed in 1st grade with other shapes)
    - Number of angles – angle is a new term and should be informally introduced. In 1st grade it was introduced as number of corners/vertices

- 2.G.3 Partition squares, rectangles and circles into two or four equal parts, and describe the parts using the words halves, fourths, a half of, and a fourth of. Understand that when partitioning a square, rectangle or circle into two or four equal parts, the parts become smaller as the number of parts increases.

New Academic Vocabulary for This Unit

- quadrilateral

- face

- angle

- half - halves

- fourth fourths

Prior Knowledge Required for This Unit

2.G.1 :
In prior grades students focused on identifying shapes and beginning to understand the difference between defining (number of sides) and non-defining (color) attributes. Students build on that understanding in 2nd grade.

2.G.3

Students were <u>informally</u> introduced to the concept of fractions in first grade when they partitioned 2-D shapes into two or four equal parts (the emphasis was on equality of the parts – not the formal fraction emphasis). So this standard deserves special attention because the emphasis now is on the fact that as the number of partitions (parts) increases, the size of the parts decreases.

Subsequent Knowledge Related to This Unit

2.G.1: Students use their previously gained knowledge about attributes to now recognize and draw shapes having specified attributes.

2.G.3. Students continue the informal introduction to fractions by now using terms *halves, fourths, a half of,* and *a fourth of*. They do NOT need to be able to use fraction notation. The formal idea and symbolism for fractions are introduced in grade 3.

Relationship Among Standards in This Unit

While both of these standards are based upon geometry, the objective of 2.G.1 is for students to identify specific attributes of 3-, 4-, and 6- sided polygons. Students should also compare the attributes of the 2D square with a 3D cube.

The objective of 2.G.3 is for students to begin using geometric shapes as a strategy for informally understanding fractions (equal parts). They should also realize that when 2 circles of the same size are divided into halves or fourths, the circle with fourths will have smaller pieces than the circle divided into halves.

Potential Instructional Strategies

2.G.1- Lesson Plan from EngageNY where students use toothpicks to build squares and cubes making comparisons between the two.
  - Link to Lesson
2.G.1- Lesson Plan from EngageNY where students draw shapes based upon specified attributes.
  - Link to Lesson Plan
2.G.1- Lesson Plan from EngageNY where students use dry spaghetti to create different types of polygons.
  - Link to Lesson Plan
2.G.3.- Lesson Plan from EngageNY where students fold, cut and compare circle and rectangular halves and fourths.
  - Link to Lesson

Resources

2.G.1: Video Lessons for Students (could be used in a flipped/ blended learning classroom) from LearnZillion (free account)
- Triangles
- Quadrilaterals
- Hexagons
- Cubes

2.G. 1: Properties of Quadrilaterals (recording sheet to use when comparing various types of quadrilaterals)
- Recording Sheet for Quad

2.G.3: Video Lessons for Students (could be used in a flipped/ blended learning classroom) from LearnZillion (free account)
- Sectioning Rectangles into equal parts
- Sectioning Rectangles different way to achieve equal parts

2. Draw more sides to complete 2 examples of each polygon.

	Example 1	Example 2
a. Triangle _____ lines were added. There are _____ total sides.		
b. Hexagon _____ lines were added. There are _____ total sides.		
c. Quadrilateral _____ lines were added. There are _____ total sides.		

3. Partition the shapes to show halves. Shade one half of each.
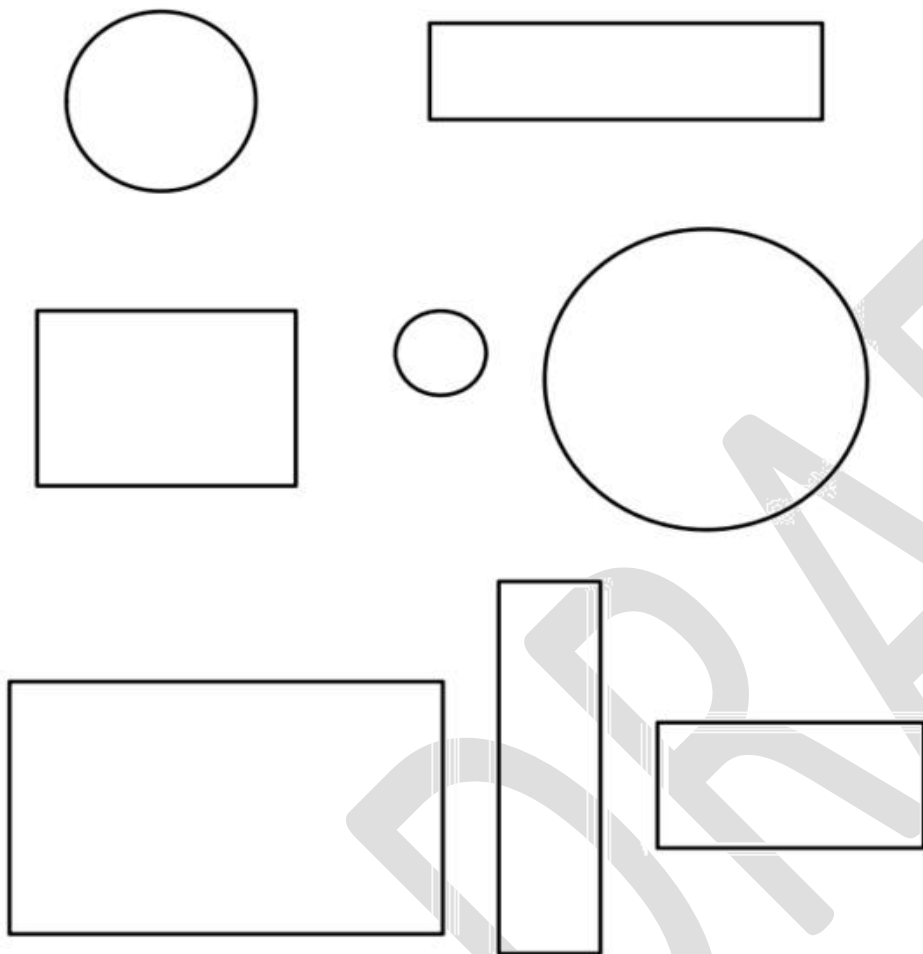
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Measurement: Length

Content Standards with Clarifying Notes

*Open bullets indicate clarifying note*s

 2.MDA.1   Select and use appropriate tools (e.g., rulers, yardsticks, meter sticks, measuring tapes) to measure the length of an object.
 2.MDA.2   Measure the same object or distance using a standard unit of one length and then a standard unit of a different length and explain verbally and in writing how and why the measurements differ.
 2.MDA.3   Estimate and measure length/distance in customary units (i.e., inch, foot, yard) and metric units (i.e., centimeter, meter).
 2.MDA.4   Measure to determine how much longer one object is than another, using standard length units.

New Academic Vocabulary for This Unit

- centimeter
- meter
- inch

- foot
- yard

Prior Knowledge Required for This Unit

It is important for teachers to introduce the vocabulary in this unit (inch, foot, etc.) as these terms and the concept of standardized units of measurement are introduced in 2nd grade. In 1st grade, students ordered three objects by length using indirect comparison; however, they did not actually use standard measures. In 1st grade students also used nonstandard physical models to show the length of an object as the number of same size units of length with no gaps or overlaps. Students will need this knowledge of length comparison to be successful in this unit where they will be asked to measure the same object or distance using a standard unit of one length and then a standard unit of a different length and explain verbally and in writing how and why the measurements differ.

Subsequent Knowledge Related to This Unit

It is important that students in 2nd grade conceptually understand measuring length (the focus of this unit). In 3rd grade, students will add to their knowledge of measurement with the skills of estimating and measuring liquid volumes (capacity) in customary units (i.e., c., pt., qt., gal.) and metric units (i.e., mL, L) to the nearest whole unit. Students need to learn conceptual as well as application skills for measurement. In 4th grade they will move to conversion of units (4.MDA.1 Convert measurements within a single system of measurement, customary (i.e., in., ft., yd., oz., lb., sec., min., hr.) or metric (i.e., cm, m, km, g, kg, mL, L) from a larger to a smaller unit.)

Relationship Among Standards in This Unit

There are two different skill sets embedded in this unit. Students being asked to 1) estimate and use tools to determine length (application skill), as well as 2) comparing the lengths of two different objects with different units of measure and comparing the same object when measuring it with different units of measurement.

Measuring Objects	Comparing Measurements
2.MDA.1 Select and use appropriate tools (e.g., rulers, yardsticks, meter sticks, measuring tapes) to **measure** the length of an object. 2.MDA.3 Estimate and **measure** length/distance in customary units (i.e., inch, foot, yard) and metric units (i.e., centimeter, meter).	2.MDA.2 Measure the same object or distance using a standard unit of one length and then a standard unit of a different length and explain verbally and in writing how and why the **measurements differ**. 2.MDA.4 Measure to determine how much **longer** one object is than another, using standard length units.

Potential Instructional Strategies

A Variety of Measurement Lessons from NC Math Tasks (see pages 50 - 58) http://maccss.ncdpi.wikispaces.net/file/view/CCSSMathTasks-Grade2.pdf

Lesson for 2.MDA.2 *Measure the same object or distance using a standard unit of one length and then a standard unit of a different length and explain verbally and in writing how and why the* ***measurements diffe***r. http://www.learnnc.org/lp/pages/3773

MATERIALS/RESOURCES

- One copy of How Big is a Foot? written and illustrated by Rolf Myller
- 8 to 10 assorted color strips of paper of various lengths (to the nearest inch); will need one set per 2 to 4 children. Sets should be identical.
- Paper clips (small, regular, and jumbo sizes)
- Inch rulers
- Paper
- Pencils

Pre-activities

Students should have had experiences in linear measuring using nonstandard units and know how to lay nonstandard units end to end, without spaces between, in order to get an accurate measure.

Activities

1. Introduce activity by telling students that they will be using paper clips to measure the strips of paper in their bags. They will need to leave the paper clips on the strips so they can record their measures and others can observe their measures.
2. Partners lay their set of paper strips on their workspace and measure each using the paper clips you give them.
3. Partners record the color and length of each strip on their paper.
4. After partners are finished measuring, ask each group for their measure for a particular color paper and record on board or on chart paper. Immediately students will disagree as to the measure. Tell them that we will record all the measurements and later we can come back to figure out the problem. Next, suggest that we try another color and repeat the process.
5. After we find differing measurements for several of the different colored paper strips, instruct students to carefully walk around and look at what other groups have done. Students quickly see that the differing measurements are due to the size of the paper clips used.
6. Read How Big is a Foot? to students. Compare what happens in the book to what happened when we measured with paper clips.
7. Distribute rulers to students. Discuss leading edge if your rulers have this. Remind students to write "inch" after each measure.
8. Partners (or small groups) put away paper clips and use inch rulers to measure their set of paper strips. Again they record color and length of each.
9. After groups are finished measuring, compare measures for each color strip and note how much more accurate the information is when we all used the same standard unit. If measures do not match, this is an excellent time to have students work to find out why they do not match (usually due to the leading edge on ruler, or some students begin with the number 1 on ruler instead of the beginning edge).

Assessment

- Teacher observes and records students who are using ruler correctly; assists those using ruler incorrectly.
- Collect and review student recording sheets to see if student correctly records measurements as well as arrives at correct measurements.

COMMENTS

Be sure that the sets of colored paper strips are identical. This way you can use color as a reference and have everyone looking at the same piece. It also makes grading/reviewing student recording sheets easier when all blue measures should be the same, etc.

Keep the pace brisk at the beginning so students don't have time to notice that the paper clips are different sizes. I give out sets of paper strips in

plastic zip-top bags to partners or groups and instruct them to begin measuring as soon as they are given their paper clips.

It is also helpful if you place clips in identical boxes before passing them out. If the boxes look alike, they aren't tipped off as to the size of the paper clips.

Early finishers can begin working on a Venn diagram (or double bubble map if you use Thinking Maps) to compare our paper clip measuring experience to the king's experience in How Big is a Foot?

Resources

LearnZillion Video How to Use a Ruler https://learnzillion.com/lesson_plans/6036-measure-using-a-ruler

LearnZillion Video How to Measure in Inches https://learnzillion.com/lesson_plans/6218-measure-with-inch-length-units

Hands-on activities for developing measurement concepts: http://schools.nyc.gov/NR/rdonlyres/A258114D-9C6B-4A1D-94A9-964DD95BE45A/0/MeasuringUp.pdf

Sample Formative Assessment Tasks/Questions

Create recording sheets for students as they measure objects around the classroom (in units of inches as well as centimeters).
Be aware of these common misconceptions:

Common Issues	Suggested Questions and Prompts
Student does not line up the ruler properly.	Provide teacher and peer guidance to make sure the student starts at the correct spot.
Student is answering a question in inches when he/she was asked about centimeters.	Have students circle the unit. Refer students to the measurement chart made in Lesson 1.

Name: _____ Date: _____

Directions: You are going to measure different items by selecting two units of different length: centimeters and inches, which are smaller units or yards and meters, which are larger units. There are different items around the room. You are going to hunt for the items listed on your recording sheet. Some items on the list ask you to hunt for items of a certain size. List the name of the item you chose to measure. Measure the items using the most appropriate measuring tools.

RECORDING SHEET

Items	Centimeter (cm)	Inch (in.)	OR	Meter (m)	Yard (yd.)
For example: The length of a paperclip	3 cm	1 inch		--------	-------
The length of a friend's face					
The length of a textbook					
The height of the classroom door					

Name: _____ **Date:** _____

Object	Number of Tiles Used to Measure Object	Measurement of Object Using a Ruler	Measurement of the Object in Inches
Crayon			_____ inches
Stapler			_____ inches
Notebook			_____ inches
Find an Object			_____ inches

Was it easier to measure using the tiles or the ruler? Why or why not?

_____

_____

Sally measured her pencil using inches and then centimeters. She noticed that the two measurements were different even though she was measuring the same object.

1 inch

about 2 centimeters

Why are the two measurements different? (One point will be awarded for each math vocabulary word used correctly in your response.)

Why are the two measurements different?

_____

_____

unit	What you are tiling and using to measure
length unit	The *size* of what you are using to measure
standard	The same unit length used in a particular place or country by agreement.

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2nd Grade Math Unit 6	

Measurement: Time and Money

Content Standards with Clarifying Notes

*Open bullets indicate clarifying note*s

- 2.MDA.6 Use analog and digital clocks to tell and record time to the nearest five-minute interval using *a.m.* and *p.m.*

- 2.MDA.7 Solve real-world/story problems involving dollar bills using the $ symbol or involving quarters, dimes, nickels and pennies using the ¢ symbol.
  - Example: If you have 2 dimes and 3 pennies, how many cents do you have?
  - Example: (higher level thinking) How many different ways can you make 37 cents using pennies, nickels, dimes, quarters, and dollars?

New Academic Vocabulary for this Unit

- analog clock
- digital clock
- a.m.
- p.m.
- dollar bills

Prior Knowledge Required for This Unit

Students should have learned to identify coins in 1st grade, as well determine each coin's value. *1.MDA.6 Identify a penny, nickel, dime and quarter and write the coin values using a ¢ symbol.)* 1st grade indicators do not include dollar bills or their value. This is new to 2nd grade.
Students in first grade also used analog and digital clocks to tell time. (*1.MDA.3 Use analog and digital clocks to tell and record time to the hour and half hour.)* In second grade, the time intervals are identified as five minute intervals. The idea of a.m. and *p.m.* are new to 2nd grade. Students do NOT need to know what a.m. or *p.m.* stands for (ante-meridiem and post-meridiem) but they should be able to appropriately add a.*m.* and *p.m.* when recording time.

Subsequent Knowledge Related to This Unit

Students in 3rd grade do not have indicators dealing with money, however students will work with both coins and bills again in 4th grade *(4.MDA.8 Determine the value of a collection of coins and bills greater than $1.00.)*
 Students in 3rd grade will continue using analog and digital clocks to tell time to the nearest minute. They will also begin to measure intervals of time. *(3.MDA.1 Use analog and digital clocks to determine and record time to the nearest minute, using a.m. and p.m.; measure time intervals in minutes; and solve problems involving addition and subtraction of time intervals within 60 minutes.)*

Relationship Among Standards in This Unit

Indicator 2.MDA.6 is a low DOK leveled skill. Students need only recall the correct time on given analog or digital clock.
Indicator 2.MDA. 7 can be taught and assessed at a higher level if teachers give students open ended question such as, "How many different ways can you show 21 cents using dimes, nickels, and pennies?" The indicator requires that students do more than just identify coins, they must solve word problems where they use their knowledge of addition/subtraction with their knowledge of coin values.

Potential Instructional Strategies

Students will work with money manipulatives to solve word problems that involve adding money amounts and making change. The lesson is introduced with the literature book, Pigs Will be Pigs. After solving the problems posed in the book, the students will work with partners to create their "pig problems". Assessment will require students to solve similar problems on a teacher made worksheet. When time allows, each student will have the opportunity to go to an Internet site to work with money problems and games (from http://www.learnnc.org/lp/pages/3505)

TIME REQUIRED FOR LESSON
60 minutes
MATERIALS/RESOURCES (click links to access printable copies)
- Pigs Will be Pigs by Amy Axelrod
- money manipulatives for each pair of students
- Piggin Out with Money worksheet
- Pigs Will be Pigs worksheet

TECHNOLOGY RESOURCES
Computers with internet connection

Pre-activities

- Students are able to add three and four digit numbers as well as add money amounts.
- They are familiar with coins and coin amounts.
- Students have worked with money manipulatives prior to this lesson.
- Students have had experience creating short stories that require addition to solve.

Activities

1. Have materials ready: money banks for each pair of children, paper, pencils, worksheets, and overhead projector.
2. Read orally: Pigs Will be Pigs.
3. Use the overhead and teacher made document Pigs Will be Pigs to show the money that each pig found. Have the students determine the amounts and record and report their findings.
4. Have students work with their partners to create their own pig problems. They should have neighbor partners solve the problem. The teacher will monitor progress and assist as needed.
5. Final Assessment will be based on successful completion of the teacher made worksheet Piggin Out with Money

Assessment

- Teacher will observe the students' work with partners.
- Students will successfully complete the teacher made worksheet, Piggin Out With Math.

Resources

- Website with both Digital and Analog clock (that keeps current time); https://www.mathsisfun.com/time-clocks-analog-digital.html

- Large interactive clock, students can move the hands on the clock which changes time on a digital clock as well http://www.visnos.com/demos/clock

Fill in the digital clock to show the
time shown on the analog clock.

How many of each coin would
you need to make 70 cents?
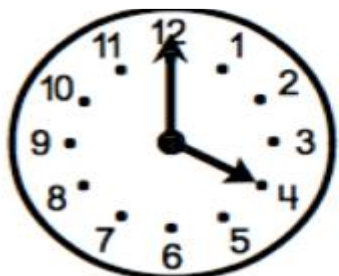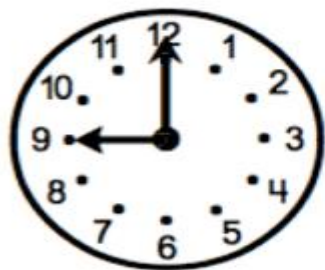
Write the answers in the boxes.

What is the total of 20¢ and 70¢?

What is 35¢ less 20¢?

Jasmine collects nickels and has 45¢ worth.
How many nickels does Jasmine have?

Don has these coins.
Which coin does he need to make $1.00?

Jim starts out with 80¢ but loses 35¢. How much does he have left?

Mary has four coins that add up to 17¢.
Which coins does Mary have?

Which four of the these
coins add up to $0.86?

60¢ is shared equally by 4 children. How much do they each get?

How much is four groups of coins
with 1 dime and 1 nickel in each group?

These coins are shared equally by
two children. How much does each child get?

Write the answers in the boxes.

5¢ + 40¢ =	10¢ + 46¢ =	21¢ + 8¢ =
20¢ – 10¢ =	49¢ – 5¢ =	18¢ – 12¢ =
35¢ + 45¢ =	62¢ + 17¢ =	80¢ + 18¢ =

Return to

2nd Grade Math Unit 7	

Creating and Understanding Data

Content Standards with Clarifying Notes
*Open bullets indicate clarifying note*s

- 2.MDA.8 Generate data by measuring objects in whole unit lengths and organize the data in a line plot using a horizontal scale marked in whole number units.

  Second Grade Heights
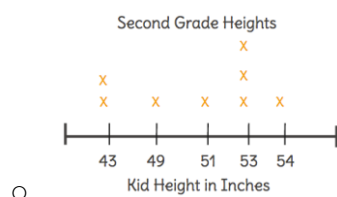
  Kid Height in Inches
  -
- 2.MDA.9 Collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale

- 2.MDA.10 Draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

New Academic Vocabulary for This Unit

- line plot
- horizontal scale

Prior Knowledge Required for This Unit

For 2nd grade indicator 2.MDA. 9, students have been collecting or representing data since kindergarten. In kindergarten, students created picture graphs from which they drew conclusions. (*K.MDA.4 Represent data using object and picture graphs, and draw conclusions from the graphs*.)
In 1st grade, students moved to collecting and representing data with up to 3 categories. (*1.MDA.4 Collect, organize, and represent data with up to 3 categories using object graphs, picture graphs, t-charts and tallies.*).

For 2nd grade indicator 2. MDA. 8, students have not yet had experience with graphing measurement data onto a horizontal axis. 2nd grade students

have not yet had experiences using standard rulers to measure. That skill is new to 2nd grade.

For 2nd grade indicator 2.MDA.10, students have had experiences in 1st grade drawing conclusions from graphs *1.MDA.5 Draw conclusions from given object graphs, picture graphs, t-charts, tallies, and bar graphs.)*

Subsequent Knowledge Related to This Unit

For 2nd grade indicator 2.MDA 9, students in 3rd grade will move beyond single unit scales to representing graphs with multiple categories. *(3.MDA.3 Collect, organize, classify, and interpret data with multiple categories and draw a scaled picture graph and a scaled bar graph to represent the data.)*

For 2nd grade indicator 2.MDA. 8, students in 3rd grade will move from collecting measurements in WHOLE NUMBER units to collecting measurements in fractions of inches. *(3.MDA.4 Generate data by measuring length to the nearest inch, half-inch and quarter-inch and organize the data in a line plot using a horizontal scale marked off in appropriate units.)* In 4th grade, students will continue to collect measurement data in fractional inches and interpret line plots based on fractions. By 5th grade, students will interpret line plots and use operations with fractions to solve questions related to the line plot. (*5.MDA.2 Create a line plot consisting of unit fractions and use operations on fractions to solve problems related to the line plot).*

Relationship Among Standards in This Unit

All of the indicators in this unit require students to create data charts (line plots, picture graphs, bar graphs from which they will draw conclusions. They should also be able to draw conclusions from t-charts and object graphs. For 2.MDA.8, it is important that students be able to measure with a standard ruler into whole number units (1 inch, 2 inches, …)

Potential Instructional Strategies

This site gives students an opportunity to practice interpreting line plots with whole number horizontal axes. No sound required.
https://www.ixl.com/math/grade-2/interpret-line-plots

At this site students can interact with the computer to read data from line plots, represent data on a line plot, read data from picture graphs, represent data on picture graphs, read data from bar graphs and represent data on a bar graph. The site reads the questions so sound is necessary.
https://www.splashmath.com/math-skills/second-grade/data/read-data-from-picture-graphs

This site is a printable worksheet where students are required to measure and use the data to create a line plot. The answer key is also provided.
http://www.commoncoresheets.com/Math/Line%20Plots/Measuring%20and%20Plotting%20(whole)/English/1.pdf

This site has limited free worksheets that go from step-by-step lesson to practice.
http://www.mathworksheetsland.com/2/22generate.html

Resources

- LearnZillion video explaining how to create Line Plot with measurement data https://learnzillion.com/lesson_plans/8106-show-measurement-data-on-a-line-plot
- Excellent interactive tutorial defining and describing how to create Line Plots http://www.k5learning.com/sites/all/files/sample_lessons/Data%20Analysis%20Lineplots%20L3%20V1%20T1a/Data_Analysis_LinePlots_L3_V1_T1a.swf
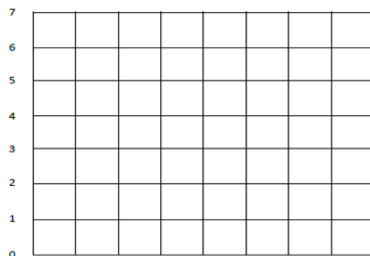
Sample Formative Assessment Tasks/Questions

Link to Measuring and Line Plot graphing (students will need ruler) from https://grade2commoncoremath.wikispaces.hcpss.org/Assessing+2.MD.9

Draw and label a bar graph to show the number of pencils in each student's desk.

Student Name	Jill	Sven	Rocco	Lyla
Number of Pencils	4	2	5	1

Title: _____